

CLAIMS

1. An elastomeric stamp (10) for printing a pattern on a substrate (500; 502) with an ink (520), the stamp (10) being at least partially formed from a
5 first material, the stamp comprising a first surface (12) in a first plane, a second surface (14) in a second plane and a third surface (16) extending from the first surface (12) to the second surface (14), the third surface (16) being permeable to the ink (520), the first surface (12) comprising a barrier layer (22) being substantially impermeable to the ink (520).
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2. An elastomeric stamp (10) as claimed in claim 1, wherein the barrier layer (22) is non-covalently bound to the first surface (12).
3. An elastomeric stamp (10) as claimed in claim 1, or 2, wherein the first
15 barrier layer (22) comprises an inorganic oxide.
4. An elastomeric stamp (10) as claimed in claim 1 or 2, wherein the first barrier layer (22) comprises a polymer material.
- 20 5. An elastomeric stamp (10) as claimed in claim 1 or 2, wherein the first barrier layer (22) comprises the first material in a modified form.
6. An elastomeric stamp (10) as claimed in any of the claims 1-5, wherein the second surface (14) comprises a further barrier layer (24) being
25 substantially impermeable to the ink (520).
7. An elastomeric stamp (10) as claimed in claim 6, wherein the first surface (12) and the third surface (16) form an angle between 60-90°.
- 30 8. An elastomeric stamp (10) as claimed in claim 6 or 7, wherein the further barrier layer (24) is of the same material as the barrier layer (22).

9. A method for printing an ink (520) in a pattern on a substrate (500; 502) of an electronic device using an elastomeric stamp (10), the elastomeric stamp (10) being at least partially formed from a first material, the elastomeric stamp (10) comprising a first surface (12; 22) in a first plane, a second surface (14) in a second plane and a third surface (16) extending from the first surface (12; 22) to the second surface (14), the third surface (16) being permeable to the ink (520), the first surface (12; 22) comprising a barrier layer (22) being substantially impermeable to the ink (520), the method comprising the steps of:
- 10 bringing the elastomeric stamp (10) into contact with a supply (510) of an ink solution;
- absorbing the ink solution in the first material;
- cleaning at least the barrier layer (22) of the elastomeric stamp (10);
- drying the elastomeric stamp (10); and
- 15 forming at least a part of the pattern by placing the elastomeric stamp (10) on the substrate (500; 502) with the barrier layer (22) contacting the substrate and transferring the ink (520) from the first material to the substrate (500; 502) via the third surface (14).
- 20 10. A method as claimed in claim 9, wherein the step of cleaning at least the barrier layer (22) of the elastomeric stamp (10) comprises rinsing the elastomeric stamp (10) with a solvent.
11. A method of producing a patterned elastomeric stamp (10) for printing
- 25 an ink (520) on a substrate (500; 502) of an electronic device, the method comprising the steps of:
- providing a master (300) having a first surface (312) in a first plane, a second surface (314) in a second plane and a third surface (316) extending from the first surface (312) to the second surface (314);
- 30 depositing a first material precursor on said surfaces (312; 314; 316) of the master (300);

generating an elastomeric stamp (10) having a first surface (12) in a first plane, a second surface (14) in a second plane and a third surface (16) extending from the first surface (12) to the second surface (14) by transforming the first material precursor to a first material, said surfaces (12; 14; 16) of the elastomeric stamp (10) being permeable to the ink (520); and

forming a barrier layer (22) on the first surface (12) of the elastomeric stamp (10), the barrier layer (22) being impermeable to the ink (520).

12. A method as claimed in claim 11, wherein the step of forming a barrier layer (22) on the first surface (12) of the elastomeric stamp (10) comprises anisotropically depositing a metal on the first surface (12) of the elastomeric stamp (10).

13. A method as claimed in claim 12, further comprising the step of oxidizing the barrier layer (22).

14. A method as claimed in claim 11, wherein the step of forming a barrier layer (22) on the first surface (12) of the elastomeric stamp (10) comprises forming a layer of polymer material on the first surface (12) of the elastomeric stamp (10).

15. A method as claimed in claim 14, wherein the step of forming a layer of a polymer material on the first surface (12) of the elastomeric stamp (10) comprises adhering a polymer material to the first surface (12) of the elastomeric stamp (10).

16. A method as claimed in claim 14, wherein the step of forming a layer of a polymer material on the first surface (12) of the elastomeric stamp (10) comprises depositing a precursor of the polymer material on the first surface (12) of the elastomeric stamp (10); and

forming the layer of the polymer material from the precursor.

17. A method as claimed in claim 16, wherein the step of forming the layer of the polymer material from the precursor is preceded by depositing a polymerization initiator on the first surface (12) of the elastomeric stamp (10).
- 5 18. A method as claimed in claim 14, further comprising the steps of:
modifying the first surface (312) of the master (300); and
depositing a precursor of the polymer material on the modified first surface (322) of the master (300).
- 10 19. A method as claimed in claim 11, wherein the step of forming a layer (22) of a second material on the first surface (12) comprises modifying a layer of the first material at the first surface (12).
20. A method as claimed in any of the claims 11-19, further comprising the
15 step of forming a further barrier layer (24) on the second surface (14) of the elastomeric stamp (10), the further barrier layer (24) being impermeable to the ink.
21. A method as claimed in claim 20, wherein the further barrier layer (24)
20 is formed from a same material as the barrier layer (22).